

REMARKS

In view of the above amendments, and the following remarks, Applicant requests favorable reconsideration of the above-identified application.

Claims 1-16, 18-24, 26-35 and 37-41 are now pending in this application, with Claims 1, 16 and 22 being independent. By this Amendment, Applicant has canceled Claims 17, 25 and 36, amended the specification, and Claims 1-5, 11-13, 16, 18-20, 22-24 and 26-35. No new matter has been added.

Claims 1-41 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant has amended the claims to attend to the matters set forth in the application as giving rise to the rejection. Accordingly, Applicant requests withdrawal of the § 112 rejection.

Claims 1-5 and 22-28 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,175,736 (Woodward, et al.) in view of The Physics Hypertextbook, @ <http://hypertextbook.com/physics/waves/refraction> (*Refraction*). Claims 6-15 and 29-41 stand rejected under 35 U.S.C. § 103 as being unpatentable over Woodward, et al. and *Refraction* in view of U.S. Patent No. 6,724,531 (Oono). Claims 16-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over Oono in view of Woodward, et al., *Refraction* and U.S. Patent No. 6,075,581 (Shirochi). Applicant traverses these rejections.

Independent Claims 1 and 16 each recite at least one birefringent plate made of a uniaxial single crystal having a refractive index difference of not less than 0.02 for ordinary and extraordinary rays. The filter satisfies one of $10^{\circ} < \theta < 27^{\circ}$ and $61^{\circ} < \theta < 80^{\circ}$.

In those equations, θ is an angle an optic axis of the at least one birefringent plate makes with a normal to a surface of the at least one birefringent plate.

Independent Claim 22 recites, in part, a filter having a first birefringent plate and a second birefringent plate. The filter satisfies one of $10^\circ < \theta_o < 27^\circ$ and $61^\circ < \theta_o < 80^\circ$. In those equations, θ_o is the angle and optic axis of at least one of the first and second birefringent plates makes with a normal to an entrance or exit surface of the birefringent plate.

In a birefringent plate of a low-pass filter in which a refractive index difference between an ordinary and extraordinary ray is 0.02 or more, there arises a problem that the conventionally-defined thickness of the plate is too thin to be processed and/or have sufficient strength. This occurs because an angle θ defined between the optic axis of the birefringent plate and a surface of the birefringent plate is typically set to 45° when making the crystal plate as thin as possible. The present invention was made to address this problem, so that a birefringent plate having a 0.02 or more refractive index difference between the ordinary and extraordinary rays may be used, with θ being appropriately set outside the conventional setting in order to allow for a thicker plate.

Woodward, et al. describes a birefringent plate which is not used as an optical low-pass filter. Consequently, Woodward, et al. does not recognize the above-discussed problem associated with optical low-pass filters using a birefringent plate. Thus, Applicant submits that one of ordinary skill in the art would not be motivated to arrive at the present invention from Woodward, et al.

In addition, Applicant notes that the Office Action relies on column 6, lines 7-32, of Woodward, et al. as teaching the claimed value of θ in the present invention.

Specifically, the Office Action notes that the angle described in Woodward, et al. is 40° plus or minus 30° . However, Applicant submits that the angle so described does not correspond to θ of the present invention. At that same section of the specification, Woodward, et al. states that “sigma (angle between optic axis and the normal to the surface of the birefringent plate) = 90° .” Accordingly, Applicant submits that the angle described in Woodward, et al. corresponding to θ is 90° , not 70° (i.e., $40^\circ + 30^\circ$).

Refraction is merely cited in the Office Action as describing the use of a single uniaxial crystal having a birefringence of not less than 0.02. Oono is cited in the Office Action merely to describe the use of an image sensing element. Shirochi is merely cited as describing that an image sensing unit can satisfy $0.015 < p/d < 0.045$. Applicant submits that none of these documents remedies the deficiencies discussed above with respect to Woodward, et al.

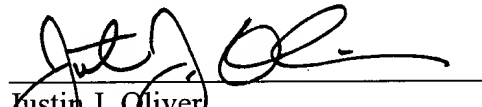
Accordingly, Applicant submits that Woodward, et al., Oono, *Refraction*, and Shirochi, taken alone or in combination, fail to disclose or suggest at least the features of a filter having at least one birefringent plate made of a uniaxial single crystal having a refractive index difference of not less than 0.02 for ordinary and extraordinary rays, wherein the filter satisfies one of $10^\circ < \theta < 27^\circ$ and $61^\circ < \theta < 80^\circ$, where θ is the angle an optic axis of the at least one birefringent plate makes with a normal to a surface of the at least one birefringent plate, as recited in independent Claims 1 and 16; and a filter having first and second birefringent plates, wherein the filter satisfies one of $10^\circ < \theta_o < 27^\circ$ and $61^\circ < \theta_o < 80^\circ$, where θ_o is the angle an optic axis of at least one of the first and second birefringent plates makes with a normal to an entrance or exit surface of the birefringent plate, as recited in independent Claim 22.

birefringent plates makes with a normal to an entrance or exit surface of the birefringent plate, as recited in independent Claim 22.

The remaining claims in the present application are dependent claims which depend from the independent claims discussed above, and thus are patentable over cited art for reasons noted above with respect to those independent claims. In addition, each recites features of the invention still further distinguishing it from the applied documents of record. Applicant requests favorable and independent consideration thereof.

For the foregoing reasons, Applicant requests withdrawal of the outstanding rejections under 35 U.S.C. § 103, and allowance of this application.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.


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